

HIGHLIGHTS OF EXPERT LECTURE ON APPLICATION OF NANO TECHNOLOGY IN CIVIL ENGINEERING

On 01-10-2014, One expert lecture was arranged by Dept. of Civil Engg. Of **Dr. Santosh G. Shah**, (*Dean, Research & Development of ITM Universe, Vadodara*) on APPLICATION OF NANO TECHNOLOGY IN CIVIL ENGINEERING for UG-7th semester & PG -1st semester students. Approximately 60 students attended the lecture and major technical details are as follows

This topic is very much vital and important to this new era of technology. The use of nanotechnology materials and applications in the construction industry should be considered not only for enhancing material properties and functions but also in the context of energy conservation. This is a particularly important prospect since a high percentage of all energy used (e.g., 41% in the United States) is consumed by commercial buildings and residential houses by applications such as heating, lighting, and air conditioning.

Nanotechnology has a significant impact in the construction sector. Several applications have been developed for this specific sector to improve the durability and enhanced performance of construction components, energy efficiency and safety of the buildings, facilitating the ease of maintenance and to provide increased living comfort. Though self-cleaning feature has been possible to attain using micron sized coatings and surface treatments e.g. Teflon™, polysilazane based coatings, etc. now this feature has become a marketing tool / motto for nanotechnology applications, especially for consumer markets like construction, textile, etc.



Nanoparticles of TiO₂, Al₂O₃ or ZnO are applied as a final coating on construction ceramics to bring this characteristic to the surfaces. TiO₂ is being used for its ability to break down dirt or pollution when exposed to UV light and then allow it to be washed off by rainwater on surfaces like tiles, glass and sanitaryware. ZnO is used to have UV resistance in both coatings and paints. Nanosized Al₂O₃ particles

are used to make surfaces scratch resistant. These surfaces also prevent / decelerate formation of bad smells, fungus and mould.

Basic construction materials cement, concrete and steel will also benefit from nanotechnology. Addition of nanoparticles will lead to stronger, more durable, self-healing, air purifying, fire resistant, easy to clean and quick compacting concrete. Some of the nanoparticles that could be used for these features are nano silica (silica fume), nanostructured metals, carbon nanotubes (CNTs) and carbon nanofibers (CNFs). Concrete structures also make profit from nano-enhanced coatings that prevent graffiti and other unwanted stains to adhere on to it. In addition to these materials, new lightweight, flame-retardant, self-healing and resilient construction materials, e.g. new nanocomposites, are expected to be helped in their development by nanotechnology.



"Nanotechnology will also have a considerable impact on glass and therefore on windows. For marketing purposes, these windows are commonly called smart windows which implies that they are multifunctional through their energy saving, easy cleaning, UV controlling and photovoltaic features.

"Nanotechnology could allow the development of materials with better insulation properties, intelligent structures capable of optimizing the use of energy. New insulating materials have been developed with the help of advances in nanotechnologies. These insulating materials are: nanofoams, nanostructured aerogels and vacuum, insulated panels (VIPs).